

Interoperability Montana Radio Project



Radio Site Infrastructure Standards Document

Version 6

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IMTC Site Standards

Overview

These specifications were established by the Interoperability Montana Technical Committee (IMTC). These specification may change depending on the site requirements as identified by the Facility Manager and approved by the IMTC.

1 Emergency Backup Power

The Contractor will provide a new 60 KW internal generator. A 1000 gallon propane tank and appropriate pad will be provided and installed at the site by the Contractor and connected to the generator. The Contractor is responsible for abiding by all state and local requirements for location and connection of the propane tank, including a 10 foot minimum distance between the propane tank and all buildings and property boundaries per State requirements. If local requirements are more restrictive, they shall prevail.

1.1 Generator

Contractor will provide all services required to provide a complete turnkey installation of all LP fuel, electrical, or other services, by qualified personnel, for the generator system.

A complete system checkout and start up will be completed by factory certified personnel. A notice to the project manager when the installation is complete is required. (Contact information will be provided when contract is awarded.) Contractor will coordinate with factory certified personnel to schedule the load test and correct any deficiencies that may be identified with regard to the contractor's scope of work for the installation, pad, propane and electrical connections.

Provide Warranty registration information and invoice or other proof of purchase including date(s), serial numbers, and models as required to properly register the system for warranty work.

1.1.1 Generator Specifications

1. Facility Manager may require a specific brand of generator. If not, any reputable, industrial- or commercial-strength generator of the necessary and adequate wattage is acceptable.
2. 60 HZ, 120/240 VAC, 1 Phase
3. 75AH, GRP26, 525 CCA battery, w/rack installed
4. 2-Amp floating battery charger
5. 1000 W block heater, thermostatically controlled to shut down at 40 degrees Fahrenheit or warmer.



6. UL mainline circuit breaker appropriate for amperage
7. Critical Muffler
8. Flex fuel line
9. Standard Electronic Governor
10. Hour Meter
11. Standard set of three manufacturer manuals
12. Factory authorized start-up on site
13. Liquid propane fuel and delivery system
14. Industrial rated generator (not residential)

Note: Generators manufactured for **Industrial** or **Commercial** use **must** be quoted. Generators manufactured for residential or light-duty use are not acceptable.

1.1.2 Generator Installation

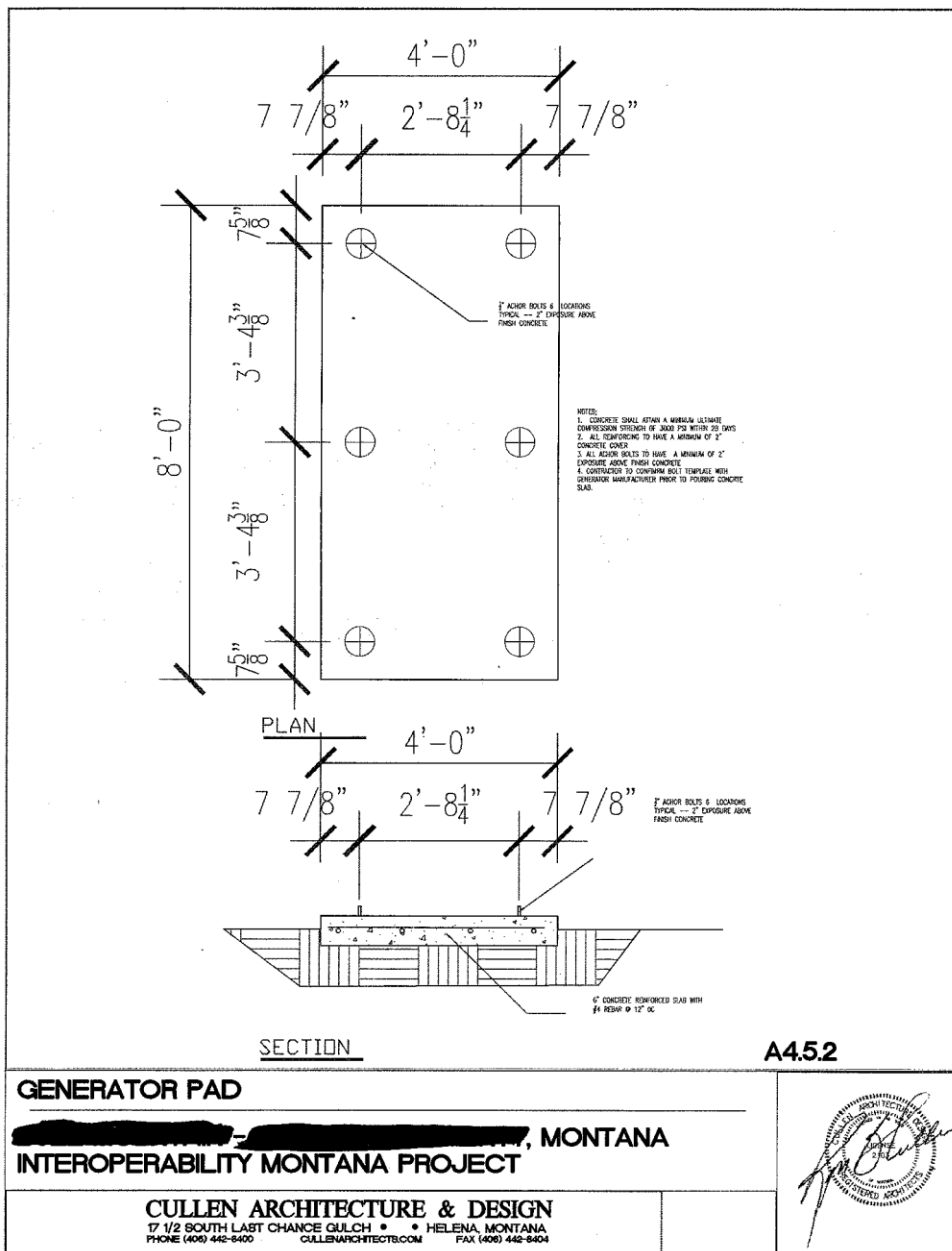
Contractor will provide all services required to provide a complete installation, by qualified personnel, of the generator, including all excavation and underground work as necessary. Contractor is responsible for all required inspections per county, state and public lands requirements. Complete system checkout and start up by factory-certified personnel is required. Personnel will conduct a load test and provide a report to the IM Project Manager.

Contractor Responsibilities

1. Delivery and offloading of the generator to the staging area, if a staging area is necessary. If a staging area is necessary, and one cannot be found by IM PM, the contractor is responsible for finding and leasing storage space. The IM expects to be able to find storage space for staging. If the contractor is required to find and lease it, an appropriate Change Order can be issued by the contractor for the additional cost.
2. Transportation and delivery of the generator to the final installation site, including loading, transporting, offloading, and installation. If a staging area is used, the contractor is responsible for transportation from the staging area to the final installation site.
3. All services, tools, materials and equipment required for the installation of the generator concrete pad (if applicable) per manufacturer's specifications.
4. Installation of the generator into the shelter or onto its concrete pad, as appropriate. Installation must be plumb and anchored per manufacturer's specifications. This includes any use of heavy support equipment needed to safely perform the task.
5. Connection of all electrical services to the generator, including all excavation and underground work as may be required.
6. Generator must be grounded per local code and appropriate Motorola R56 guidelines.

1.1.3 Generator Concrete Pad Specifications

- 4 foot x 8 foot x 6 inches thick.
- Number 4 rebar on 12 inch centers.
- Must meet 3000 psi
- Broom finish





1.2 Automatic Transfer Switch

Provide an automatic transfer switch and all labor and materials to connect generator to auto transfer switch and the transfer switch to the electrical supply, per manufacturer instructions. Note: at time of order, contractor will be notified if transfer switch has been pre-installed in the equipment shelter at the shelter factory.

1. Installation in shelter
2. 600 Volt contactor
3. Rated at appropriate amperage
4. 2 Pole construction
5. Operating at 60 HZ
6. 240 Volts, 1 phase
7. In-phase adjustable control
8. 7-Day programmable exerciser
9. 2-wire start circuit
10. 2-year limited warranty
11. Set of 3 manufacturer manuals
12. NEMA 1 Enclosure

1.3 Alarm System

Alarm capabilities provide the customer the ability to plug the generator system into the monitoring system at the radio site so that remote monitoring can be conducted from a remotely located dispatch or maintenance center. For example:

1. **Onan®/Cummins® Generators** - Provide the transfer switch with the alarm option. (OTPC - The Cummins® OTPC transfer switch is more advanced then the OTEC and provides Date/time stamped event recording of up to 50 events.)
2. **Generac® Generators** – Provide the H100 controller on the generator and the HTS transfer switch, not the R series controller and RTS transfer switch. (The H series controllers and transfer switched provide monitoring capabilities.)

Minimum alarm requirements are:

1. Commercial Power status (AC on/off). (Standard: Program to stay on for 15 minutes after power is restored.)
2. Remote re-set/start
3. Generator on/off
4. Low oil pressure
5. Low fuel pressure (propane)
6. Over crank
7. High coolant temperature
8. Low coolant level
9. Low battery voltage
10. Over speed



1.4 Propane Tank

Contractor will provide transportation and all services, tools, conduit, piping, and other materials as required to provide and install one (1) 1000-gallon propane tank onto a concrete pad and anchored per manufacturer's specifications. This includes gas line for liquid propane to the shelter and connection utilizing code compliant NEMA boxes, other parts, systems, and/or components required to connect to the generator. Contractor is responsible for all required inspections per county, state or public lands requirements.

1. The Contractor shall provide services to install the propane tank to its concrete pad, and provide all services including gas line hook up, pressure testing, and all required inspections per county or public lands requirements.
2. Tank must be grounded per R-56 standard.
3. This will include all excavation and underground work as may be required;

1.4.1 Propane Tank Pad

4. The propane tank must be set back a minimum of 10 feet from any building per NFPA specification. If local building codes require a greater distance than this, local codes will prevail.
5. Concrete pad for the 500 gallon propane fuel tank: use specifications for the 1000 gallon propane fuel tank.
6. Concrete pad for the 1000 gallon propane fuel tank: (Tanks are normally 42" by 180")
 - i. 12 foot x 4 foot x 4 inches thick.
 - ii. Fiberglass reinforced
 - iii. Must meet 3000 psi rating
 - iv. Broom finish

1.4.2 Propane Tank Installation

Contractor will provide all services required to provide a complete installation, by qualified personnel, of the propane system. Installation configuration is to include gas line for liquid propane to the shelter and connection to the generator utilizing code-compliant NEMA boxes, other parts, systems, and components required. Contractor is responsible for all plumbing that is required to connect the propane supply to the generator, including all excavation and underground work as necessary. Contractor is responsible for all required inspections per county, state and public lands requirements.

Contractor Responsibilities:

1. Delivery and offloading of the propane tank to the staging area, if a staging area is necessary. If a staging area is necessary, and one cannot be found by IM PM, the contractor is responsible for finding and leasing storage space. The IM expects to be able to find storage space for staging. If the contractor is required to find and lease it, an appropriate Change Order can be issued by the contractor for the additional cost.



2. Transportation and delivery of the propane to the final installation site, including loading, transporting, offloading, and installation. If a staging area is used, the contractor is responsible for transportation from the staging area to the final installation site.
3. All services, tools, materials and equipment required for the installation of the propane tank concrete pad (foundation) per manufacturer's specifications.
4. Installation of the propane tank onto its concrete pad. Installation must be plumb and anchored per manufacturer's specifications. This includes any use of heavy support equipment needed to safely perform the task.
5. All excavation and underground work as may be required to appropriately and correct connect the propane tank to the generator.
7. Propane tank must be grounded per local code and appropriate Motorola R56 guidelines.

2 Tower Specifications

2.1 Tower Description

- A. It is the responsibility of the Contractor to design the tower with sufficient strength to support the microwave dishes, antennas and other equipment as specified by IM Technical Committee and found in Table 1 – Tower Loading Table.
- B. Contractor will install the tower foundation according to tower manufacturer requirements to satisfy environmental and load requirements, and based on the results of the soil survey.
 1. Strength inspection including break tests, to be conducted at 7/14/28 days, a third-party testing and inspection company.
 2. Digital images of the foundation rebar placement before the concrete is poured. (Building Permit requirement).
 3. Site preparation in the area of the proposed tower foundation, will involve the excavation and backfill for engineered foundation.
 4. Tower foundation to be designed and constructed to support a 150' tower as described in Table 1 – Tower Loading Table.
- C. An ice bridge is required. It must be of sufficient strength to protect the cables from falling ice. It will be secured between the shelter and the tower so that the cables can be protected along their entire length between the shelter and the tower.

2.2 Tower Materials To Be Supplied

- A. Complete tower steel and hardware.
- B. Anchor bolts and templates.
- C. No antenna mounts to be supplied with tower. Microwave and VHF radio vendors will supply the antenna mounts.
- D. Climbing step bolts: Provide climbing step bolts for one leg from ground level to the top of tower and provide step bolts on the other two legs to the 80' level.. **Anti-climb device is required.** Internal climbing ladder to be installed to the top of the tower.



- E. One (1) wave guide support ladder.
- D. Fall protection safety cable kit with two (2) removable brakes and mounting brackets. The climbing kit hardware and associated cables must include hardware to secure the cables when not in use so that the wind does not whip the cables and cause damage to the tower or antennas. Damage caused by improperly mounted wire ropes will be responsibility of the tower company (Tower climbers are required to provide their own harness.).
- E. Ice Bridge: Provide and install an ice bridge between the equipment shelter and the tower. New sites require 30 feet between tower and shelter. Two (2) support posts at the shelter, 2 support posts at the tower, and 2 support posts every 5 feet in between. Each post is to be cad-welded to meet R56 Grounding Standards.
- F. Grounding bus bar at the bottom of the tower and a grounding bus bar every 100 feet.
- G. Professional engineer-certified tower profile and foundation drawings.
- H. Provide digital images of progress at each stage of construction for Montana building permit including 1) finished hole, 2) finished hole with rebar – before concrete is poured, 3) after concrete poured but before back fill, and at each major stage of tower stacking.
- I. Final erection drawings and digital images of the tower. (Montana Building Codes Bureau requirement.)



2.3 Tower Loading And Other Engineering

- ◆ Microwave dish antennas include radomes.
- ◆ VHF Antennas: twenty one (21) foot radio antennas with LMR 600 transmission line using 3 foot side arm

Tower type	Self Supporting				
Tower Height	100 ft				
Initial Tower Loading	Antenna Type	Center Line	Miles/ Azimuth	Quantity	Path
Microwave dish	6'	94'	TBD	1	Future
Microwave dish	10'	90'	TBD	3	Future
Microwave dish	10'	40'	TBD	3	Future
VHF	21' Stick	100'	TBD	2	Future
VHF	21' Stick	70'	TBD	3	Future
VHF	21' Stick	60'	TBD	3	Future
VHF	21' Stick	30'	TBD	3	Future
VHF	21' Stick	150'	TBD	3	Future
VHF	21' Stick	120'	TBD	3	Future
Basic Wind Speed			100 mph		
Radial Ice			1"		
Comments (grounding, painted W/G or dish, other):			Tower will utilize round steel for tower legs and angular steel for bracing. Galvanized, non reflective material (battleship gray)		

Table 1 – Tower Loading Table

It is the responsibility of the contractor to assess proper wind and ice loading per location along with any applicable state or local building codes. The tower structure design must conform to ANSI/EIA/TIA-222-F-1996 code.

Contractor to provide geotechnical engineering and analysis including a PDF file of the Geotechnical Engineering report at completion of the project.

- A. Install the concrete foundation, based on engineering soil analysis of site.
- B. Strength inspection including break tests, to be conducted at 7/14/28 days, by a third-party testing and inspection company. (Contractor responsibility.)



- C. Digital images of the foundation rebar placement before the concrete is poured. (Building Permit requirement).
- D. Site preparation in the area of the proposed tower foundation will involve the excavation and backfill for engineered foundation.
- E. Tower foundation to be designed and constructed as per specifications in the Soil Study Analysis Report - Section 10.

2.4 Tower Installation Instructions

Contractor shall be responsible for:

1. Assembling and erecting tower in accordance with OSHA and TIA/EIA standards.
2. Installing climbing ladder, anti-climbing safety device, and fall protection device.
3. Providing any necessary tools and material required to paint communication tower and any reflective attachments that are installed on the tower, if such are required.
4. Procuring all necessary tools and materials required for the installation of the tower including placing and securing of the tower onto its new foundation.
5. Providing all necessary tools, labor and equipment to install cable ladder and ice bridge system from the top of tower to the RF cable entry port at the communication shelter.
6. Ensuring that all soil around the tower is returned to its preconstruction state. Remove excess soil if necessary.
7. Providing all services to unload the tower from any and all delivery equipment (trucks, trailers, etc.). This includes, but is not necessarily limited to (as necessary) crane, forklift, hand trucks.
8. Providing equipment to place tower in its temporary location in any storage facility, as required and transport tower from temporary storage location if necessary (within 100 miles of site).
9. Providing all services to install and set the tower onto its foundation provided by Contractor. This includes any use of heavy support equipment needed to safely perform these tasks.

2.5 Ice Bridge

Note: Detailed specifications to be provided in the future.

- A. A 15 foot or longer, 24" wide, ice bridge will be provided by the Contractor, to be secured between the shelter and the tower to protect the cables from falling ice. Ice bridge will have cable hangers installed. There will be two (2) support posts at the shelter, 2 support posts at the tower, and 2 support posts every 5 feet in between. Each post is to be cad-welded to meet R56 Grounding Standards.
- B. New sites require minimum of 30 feet between tower face and shelter. There will be two (2) support posts at the shelter, 2 support posts at the tower, and 2 support posts every 5 feet in between. Each post is to be cad-welded to meet R56 Grounding Standards.

See Appendix B for details.



2.6 Ice Shields

Note: Detailed specifications to be provided in the future.

3 Shelter Specifications

3.1.1 Specifications

1. Triple (3) point locks on all exterior doors.
2. One (1) 3'x7' exterior steel door with Best lock hardware (equipment room).
3. One (1) 4'x7' exterior steel door with Best lock hardware (generator room).
4. Brown Stone Aggregate (for pre-fabricated shelters- Thermo Bond type).
Note: If the shelter is for a BLM site and it is not a pre-fab with Stone Aggregate then BLM requires - color from Columbia Paints, called Pralines-n-Cream, the number is 5740W. Any trim will be painted Abbey Brown, number 5345N.) Check with BLM to verify color.
5. Snow hatch (roof access) with interior ladder
6. R-values of 13 in the walls and floor & R-22 in the roof.
7. Galvanized "I" beam skid assembly.
8. Two-ply rubber roofing material with galvanized roof edging.
9. Commercial vinyl tile floor covering.
10. Finished Interior wall - 3/4" Oriented Strand Board /Fiber Reinforced Plywood (OSB/FRP) interior finish.
11. Roof Load to be 150 psf or local zoning requirements whichever is greater. Roof sloped from the center to prevent water pooling.
12. Seismic Design Category C or better.
13. Shelter average wind rating 120 mph.
14. Rodent proof.
15. Two 4-ton, Bard® HVAC units with economizer,
 - Controller requirements:
 - Capability to set heater to activate at 45 degrees Fahrenheit or lower
 - Capability to set economizer to run between 68 degrees to 83 degrees Fahrenheit
 - Capability to set air conditioner to activate at 83 degrees Fahrenheit or higher*Note: this requires an additional unit capable of programming the controller.*
16. Interior and exterior grounding per current R56 specifications.
17. One (1) - Alarm dry contacts package wired to terminal strip, including intrusion, high/low temp and smoke.
18. One (1) - Interior ground halo with two (2) master ground bars, per R-56.
19. One (1) – Carbon Dioxide (CO₂) fire extinguisher mounted on the interior wall near the main distribution panel.
20. One (1) - 10# ABC fire extinguisher mounted on the interior wall near the main distribution panel.
21. One eight hole Microflect entry panel (4" diameter).



22. Cable tray to run down the center of the shelter, starting at the Entry Port, additional cable trays to be placed above each row of racks connecting to the center cable tray and running to the wall in accordance with the floor plan.
23. Complete **Montana Professional Engineer-stamped** shelter drawing package.
24. Electrical package:
 - A. Square D is the preferred manufacturer for all electrical distribution panels, sub-panels, and breakers.
 - B. One (1) meter base and 200 amp fused main disconnect.
 - C. One (1), 200 amp distribution panel with a minimum of 40 spaces for breakers.
 - D. Three (3), 30 amp breakers for Motorola Trunking Equipment.
 - E. Breakers to accommodate the electrical requirements.
 - F. No electrical outlets above the row of three (3) racks labeled for “Motorola Trunking”
Note: Motorola will be responsible for installation of the electrical from distribution panel to its equipment.
 - G. Two (2) Twist-lock receptacles on separate 20 amp breakers for every row of three racks (see sample floor plan)
 - H. One (1) duplex receptacle (mounted on walls) between each row of racks and each end wall (connected to a single 20 amp breaker) for “test equipment only”. Location is according to the floor plan.
 - I. One (1) duplex receptacle on the wall in the generator room near generator room exterior door
 - J. One (1) external GFI duplex receptacle (mounted on exterior wall) beneath the Entry Port.
 - K. One (1) external GFI duplex receptacle (mounted on exterior wall) near the entry door.
 - L. One (1) 4-foot fluorescent light between each row of racks and sufficient lights for the main walk way (see floor plan).
 - M. One (1) 20 amp, twist-lock overhead outlet located near combiners (see sample floor plan).
 - N. One (1) vandal-proof exterior light with switch mounted on inside wall near entry door to equipment room.
 - O. All electrical wires, boxes, conduit, etc. to make a complete assembly.
 - P. Space and preparation for one (1) 200 amp generator Transfer Switch.
 - Q. Electrical cables are to be buried from transformer to shelter.

3.1.2 Shelter Installation – Contractor Responsibilities

1. Provide all services, tools, material and equipment required for the design/installation of the foundation for the shelter per the manufacturer specification.
2. Provide all services to build and pour shelter concrete pad, provide and install anchor bolts for new shelter, including appropriate Motorola R56 grounding guidelines for the shelter.
3. If shelter door threshold is higher than 8 inches from the ground, provide stairs to shelter and generator entrance doors to allow for normal entry and exit.
4. Foundation strength inspection including break tests, to be conducted at 7, 14, and 28 days, by a third-party testing and inspection company.

5. Provide all services to install and set the prefabricated shelter onto the concrete pad. Installation must be plumb and anchored per manufacturer's specifications. This includes any use of heavy support equipment needed to safely perform the tasks.
6. Provide all services to unload the prefabricated shelter from any and all delivery equipment (trucks, trailers, etc.). This includes, but is not necessarily limited to (as necessary) crane, forklift, hand trucks. Contractor shall also provide equipment to place shelter in and retrieve shelter from its temporary location in any storage facility, as required.
7. Transport of the shelter to the site from the designated staging area. Provide a crane to offload the shelter at the site. The successful bidder will contact the Primary Contact person for the location of the staging area.
8. The shelter design shown below is an integral part of this specification and is to be used by the contractor as a guide for placement of cable ladders, electrical outlets, lighting, transfer switch(es), and doors.

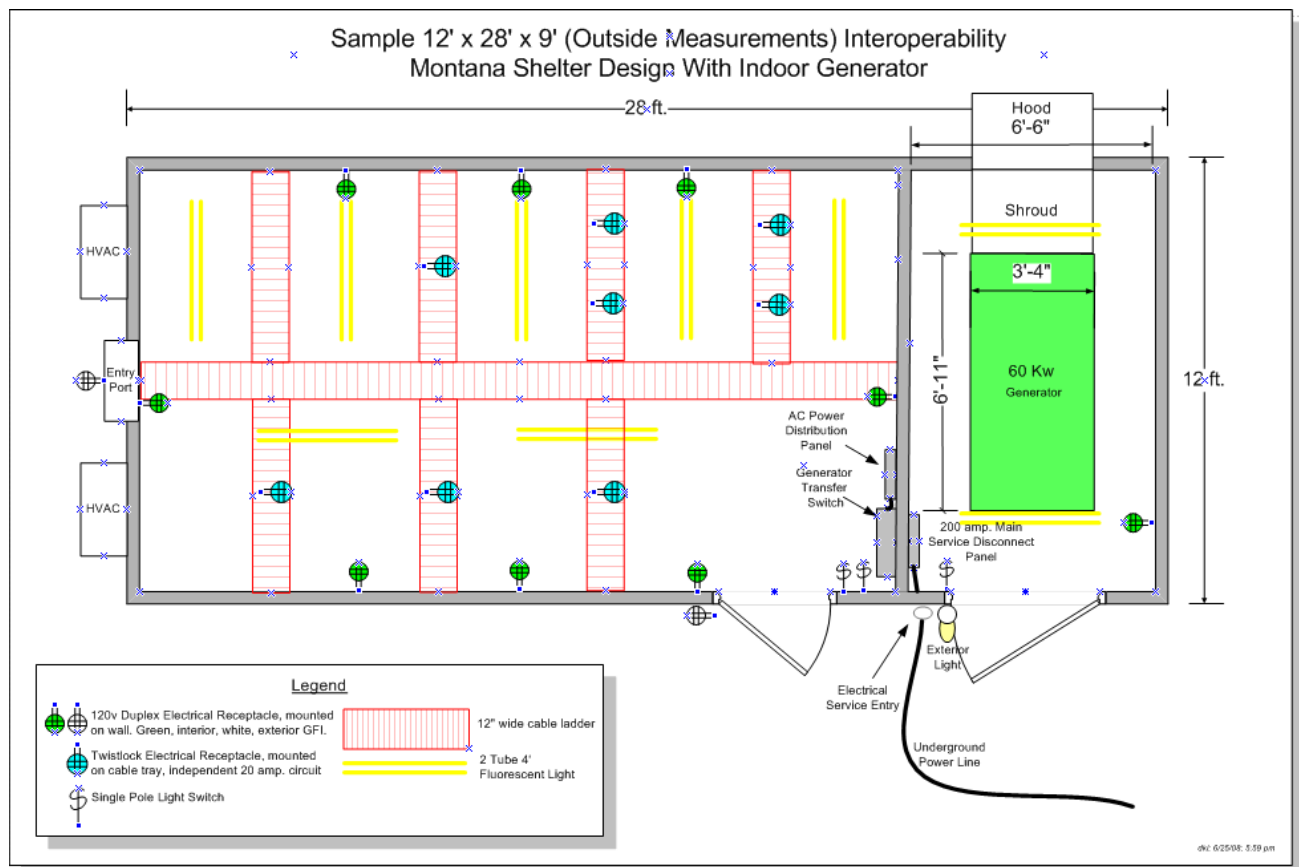


Figure 1 – Sample Shelter Design



4 Security Fencing Specifications

Perimeter Security Fence - Provide and install chain link fences and gates as complete units controlled by a single source including all necessary erection accessories, fittings, fastening, etc., required for a sound, secure and complete installation as specified herein. Contractor will finalize fence dimension with Site Manager and Project Manager after all foundations are in place.

Completely coordinate with work of other trades.

The following fence specifications were adopted by the IMTC on March 19, 2007.

4.1 Description of Work

Provide and install chain link fences and gates as complete units controlled by a single source including all necessary erection accessories, fittings, fastening, etc., required for a sound, secure and complete installation as specified herein and as shown on Sheets A-1 and A-2, bound herein.

4.2 General

Dimensions: Dimensions indicated for pipe are outside dimensions, exclusive of coatings.

4.3 Manufacturers

Subject to compliance with requirements, provide products of one of the following:

A. Type II Galvanized Steel Fence Piping:

“SS-40” by Allied Tub and Conduit Corp.

“TUF 40” by American Fence Corp.

Or As Approved.

B. Galvanized Fabric:

Master-Halco, Inc.

Merchants Metals, Inc.

Or As Approved.

4.4 Materials

A. Steel Fencing:

1. **Fabric:** No. 9 Ga. (0.148”) finished size steel wires, 2” mesh, both top and bottom selvages twisted and barbed. As per galvanized I/A/W, chain Link Fencing Manufacturer’s Institute (CLFMI), Fed. Spec. RR-F-191 and ANSTM A 392.

- a. Furnish one-piece fabric widths.

- b. **Fabric Finish:** Galvanized, ASTM A 392, Class II, with not less than 2.0 oz. zinc per sq. ft. of surface.

- c. Fabric shall be hung on the outside face of fence framework.



2. **Framework:** Hot dipped galvanized on interior and exterior surfaces; zinc coated Class 1, Steel pipe, Grade B, Type II, ASTM A 569, with 1.0 oz zinc per sq. ft. of surface +/- 0.1 oz. per sq. ft.; Chromate Conversion Coating shall be 30 micrograms per sq. in. +/- 1.5 micrograms per sq. in.; thickness of Clear Coating shall be nominal 0.5 mils +/- 0.2 mils; ASTM F 669 for strength.
3. **Fittings and Accessories:** Galvanized, ASTM A 153; RR-F-191/4C.
- B. **Framing and Accessories:**
 1. **Line Posts:** Space 10'-0" o.c. maximum, unless otherwise indicated, or following sizes and weights: 3.275" OD steel pipe, 3.12 lbs. per lin. ft.
 2. **End, Corner and Pull Posts:** minimum sizes and weights as follows: 2.875" OD steel pipe, 4.64 lbs. per lin. ft.
 3. **Top Rail:** 1.625" O.D. Steel pipe. 1.82 lbs. per lin. ft., continuous with no joints within 10'-0" of corner or gate posts.
 4. **Gate Posts:** furnish posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

<u>Leaf Width</u>	<u>Gate Post</u>	<u>lbs/lin.ft.</u>
Over 6' to 13'	4.000" OD pipe	5.56
- C. **Tension Wire:**

7-gauge, coated coil spring wire, ASTM A 824, Type II, Class 2. Locate two inches (2") maximum above the bottom of fence fabric and at inside face of fence fabric. At fence posts, the tension wire shall be between the fence fabric and fence posts.
- D. **Post Brace Assembly:**

Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as posts for brace, and truss to line posts with 0.375" diameter rod and adjustable tightener. Horizontal brace shall extend from corner and gate posts to the first adjacent line post.
- E. **Stretcher Bars:**

One-piece lengths of galvanized steel equal to full height of fabric, with minimum cross-section of 3/16" X 3.4". Provide one stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into line post.
- F. **Stretcher Bar Bands:**

Space not over 15" o.c. to secure stretcher bars to end, corner, pull, and gate posts.
- G. **Barbed Wire Supporting Arms:**

Manufacturer's standard galvanized barbed wire supporting arms, 14 ga. (minimum) pressed steel and galvanized to match frame work, with provision for anchorage to posts and attaching 3 rows of barbed wire to each arm. Supporting arms may be either attached to posts or integral with post top weather cap and must be capable of withstanding 250 lbs. downward pull at outermost end. Provide following type:

 1. Single 45 degree arm for 3 strands barbed wire, one for each post. Coordinate with vertical gate extensions.
 2. "V-arm", double 45 degree arms for 3 strands barbed wire per each arm, one for each post.
- H. **Galvanized Barbed Wire:**

2 strand, 12-1/2 ga. Wire with 14 ga. 4-point round barbs spaced not more than 5" o.c.; ASTM A 121, Class 3. Three stands of barbed wire required for installation.

**I. Wire Ties:**

As per ASTM A 121 and ASTM F 626.

1. For tying fence fabric to top rail, use 12. ga. galvanized steel ties or ties of the same gauge and material as the fencing, spaced 24" o.c.
3. For tying fence fabric to line posts, use 12. ga. galvanized steel ties or ties of the same gauge and material as the fencing, spaced 12" o.c.
4. For tying fence fabric to rails and braces, use 12 ga. galvanized steel ties or ties of the same gauge and material as the fencing, spaced 24" o.c.
5. For tying fence fabric to tension wire, use 12 ga. galvanized steel ties, ties of the same gauge and material as the fencing, or clips spaced 24" o.c.

J. Concrete:

Provide concrete consisting of Portland cement (ASTM C 150), aggregate (ASTM C33), and potable water **as supplied from a pre-mix concrete company only**. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi using at least 4 sacks of cement per cu. yd., 1" maximum size aggregate, maximum 3" slump, and 2% to 4% entrained air.

K. Size: As per ASTM F 567 and as specified herein.

1. Hole diameter shall be at least four (4) times the largest cross section of the post and no smaller than 12 inches (12"Ø in diameter).
2. Hole depth shall be a minimum of thirty-six inches (36") at all line posts; Forty-two inches (42") at all terminal, corner, pull, and gate posts.

L. Gates and Accessories:**1. General:**

- a. Fabricate perimeter frames of gates from **1.90" O.D. Class I steel pipe**, finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories. Space frame members maximum of 8'-0" apart, unless otherwise indicated.
- b. Provide same fabric as for fence. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attached stretcher bars to gate frame at not more than 15" o.c.
- c. Install diagonal cross-bracing consisting of 3/8" diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.
- d. Where barbed wire is above gates, extends end members of gate frame 1'-0" above top member. Provide necessary clips to receive and secure 3 strands of wire.

2. Gate Hardware:

Provide hardware and accessories for each gate, galvanized per ASTM A 153, and in accordance with the following:

- a. **Hinges:** Size and material to suit gate size, non-lift-off type, offset to permit 180 degree gate opening. Provide 1-1/2 pair of hinges for each leaf over 6'-0" nominal height.
- b. **Latch:** Provide horizontal sliding rod (at middle cross bar) to permit operation from exterior side of gate, with padlock eye as integral part of latch.



- c. **Keepers:** Provide keepers for vehicle gates, which automatically engage gate leaf and holds it in open position until manually released. Each gate leaf shall have one (1) keeper. **Keeper shall be placed in concrete 12" in diameter X 24" deep.**
- d. Location of keepers shall be on exterior side of each drive-through gate leaf and shall allow each gate to swing towards the exterior of the compound 170 degrees from the closed position.

4.5 Installation

- a. Install in accordance with ASTM F 567, written installation instructions of fencing manufacturer, and as specified herein to provide a secure, aligned installation.
- b. All sub-grade items shall be anchored in concrete as detailed herein. This includes, but is not limited to, line, terminal, corner, pull, gate posts and gate keepers.
- c. Tie existing chain link fencing to new chain link fencing at a new post, as required.
- d. Bottom of gates shall be adjusted to have two inches (2") maximum clearance to finish grade in the closed position.
- e. Barbed wire shall be secured to supporting arms in such a manner to prevent easy removal.

5 Electrical

5.1 Electrical Service

The Contractor shall provide for 200 amp single phase electrical service to be brought to the site by the appropriate power company or utility. This cost will be the responsibility of the Contractor.

Contractor shall provide a meter base mounted on the shelter or as specified according to the site plan diagram.

5.1.1 Electrical Installation

All installation tasks required for electrical services shall be coordinated and/or provided by the Contractor including power company service installation, power line installations, transformer locations, building main feed hook up, meter base installation, feeder line hook up, and all required state, local, and federal pre- and post-completion inspections required by law. It is the responsibility of the Contractor to meet all current NEC, Motorola R56 grounding, and TIA/EIA-568-B cabling specifications.

5.1.2 Electrical Permit

The Contractor shall pay for all electrical inspections and the Contractor shall be responsible for securing the electrical permits from the necessary entities.



Responsibility for obtaining use easements to bring power to the site, if necessary, will be the responsibility of the County or IM.

6 Site Grounding

Per Motorola R-56 Standards, this to include the tower, shelter, generator, fence, propane tank, ice bridge.

1. Contractor shall provide all necessary services, tools, conduit, piping, and other materials as may be required to install R56 grounding system based on TIA/EIA grounding specifications to meet Motorola R56 grounding requirement. This shall include all excavation and underground work as may be required. Complete site grounding (tower, shelter, fence, propane tank, and generator).
2. It is the responsibility of the contractor to meet all NEC, R56 grounding, and TIA/EIA-568-B cabling specifications and provide necessary electrical permits.
3. The Motorola R-56 grounding specification is available from Motorola by calling Motorola Parts, 1-800-422-4210 and requesting Part Number 9880384V83.

Motorola Contact is:

Mark Canton,

Email: mcanton@motorola.com

Phone: (888) 507-1555

Cell: (406) 698-8489

7 Road

There is a good road to the site. It is not expected that improvements will be necessary, but Contractor is responsible for making this determination before contract is signed.



8 Removal and/or Site Reclamation

The contractor will

1. All disturbed areas shall be reclaimed to pre-construction state.
2. Remove any grounding mats, wires, concrete, and guy wire stakes from the premises.
3. Reclaim ground to its natural state by seeding it back to a native grass seed mixture or an approved mixture by the landowner, or site will be graded away from all structures and have the ground sterilized and landscaped with $\frac{3}{4}$ " gravel or with material specified by landowner.
4. Permit landowner to view the site and approve the reclamation.

9 Additional Information

1. Contractor shall provide onsite sanitation facilities for employees and sub-contractors.
2. Contractor shall ensure that no excess concrete is dumped on or near the site by any concrete supplier or sub-contractors utilized by the Contractor, and that excess soil from excavation is removed from the site.
3. Contractor shall comply with all current Montana fire status regulations while traveling to, visiting and leaving the site.
4. Contractor, all employees and sub-contractors shall comply with all site owner and land owner requirements while traveling to, visiting and leaving the site. This may include pre-notification prior to visits.
5. Contractor shall pay all employees and sub-contractors the Montana prevailing state wage for all work conducted in the state of Montana.



10 Environmental Assessment (EA) Study

10.1 Site Information

- **Section, Township, Range** (if known)
- **Project Type**
Describe the work to be completed at this site. *Example: This existing site is being updated with a new shelter (12'x28'x9') with an internal generator and a new 100' self supporting tower.*
- **Tower Type & Height**
If applicable, describe the existing or proposed new tower type (guyed, self supporting or other) and height
- **Preliminary design plans, site plans, etc. depicting project limits, proposed ground disturbance, etc.** See Figure 3 - Site Map.

10.2 Scope Of Work

10.3 Work Details

These work details are provided as a general outline of work typically and normally conducted and produced as part of a Statement of Work (SOW) to meet the Environmental Planning and Historic Preservation (EHP) requirements of the Federal Emergency Management Agency (FEMA) as outlined in FEMA Information Bulletin 271, titled “*Environmental Planning and Historic Preservation Requirements for Grants.*”

Contractor will furnish all services, labor, materials, and equipment to produce an SOW for indicated proposed radio site. According to FEMA IB 271, this includes:

- Basic project information (name of project, name of grant and grantee, grant award number, fiscal year, overall purpose and scope of the project, estimated cost, etc.).
- Precise location of the project (street address, city, and state, or latitude and longitude coordinates).
- Visual documentation (site/structure photographs; plans/drawings that define the size and precise location of proposed work; US Geological Survey topographic, flood and wetlands maps; aerial photographs, etc.).
- Description of the project, including (as applicable):
 - Dimensions/acreage/square footage of structure and/or land affected, with height and structural support information for all communication towers.
 - Extent and depth of ground disturbance for new construction and structure modification, including trenching for utility lines, installation of fencing and light posts, tower footings and pads, etc.
- Special elements of the project, including:
 - Special equipment that will be used, staging areas, access roads, easements, etc.
 - Extent of structural modification.



- Year affected building/structure was built (if applicable).
- Information about features, resources, and potential adverse impacts at or near the site, including:
 - Water bodies (rivers, lakes, streams, wetlands, etc.).
 - Floodplains.
 - Historic and cultural resources (historic districts, buildings, landscapes, bridges, piers, dams, archaeological sites, etc.).
 - Migratory birds.
 - Threatened and endangered species and/or critical habitat.
 - Vegetation, including general types of plants, trees, or lack thereof.
 - Geologic features.
 - Tribal cultural and religious sites.
 - Special areas (forests, wildlife refuges, reserves, etc.).
- Any recent or relevant studies, reports, or surveys that were prepared for other agencies or purposes and provide information on environmental resources and/or historic properties in the project area.

The contractor is expected to bring their own expertise into the preparation of the study and include any and all tasks, items, and reports typically and normally included in an SOW of this nature, whether they are included in the list above or not.

The contractor shall deliver the completed SOW to Interoperability Montana Project Management (IM PM). Acceptance of the SOW and a determination by FEMA is required before payment will be made to the contractor. Payment will not be made until it is known with certainty that the SOW will meet the requirements of FEMA.

10.4 Performance Period And Change Management

The required completion date is one hundred and twenty (120) days (inclusive) after the contract signing date.

It is understood that unforeseen circumstances (such as weather) may delay the Start Date or negatively impact the timelines, schedules, and/or deadlines. Any changes, however, to a mutually agreed-upon contractual dates, schedules, and/or deadlines must be agreed upon and documented as formal changes to the contract. Appropriate documentation of these changes must be submitted by the vendors to the IM Project Directors (IMPD) and approved by the IMPD in order to become effective.

10.5 Pictures of Site

Figure 2 – Picture(s) Of The Site

Include appropriate pictures of the site.

Figure 3 – Google™ Earth Photo Of The Site



Include image copy from Google Earth.

Figure 3 – Site Map

Insert the site map diagram

**10.6 FEMA Information Bulletin 271 (IB 271)****Grant Programs Directorate Information Bulletin
No. 271 December 05, 2007**

TO: All State Administrative Agency Heads
All State Administrative Agency Points of Contact
All State Homeland Security Directors
Transit Security Chiefs

FROM: Tracey Trautman, Director
Grant Development and Administration, Grant Programs Directorate

SUBJECT: Environmental Planning and Historic Preservation Requirements for Grants

This Information Bulletin (IB) provides general guidance to grantees on environmental planning and historic preservation (EHP) requirements for grant funded projects involving communication towers, physical security enhancements, new construction, renovation, and modifications to buildings and structures that are 50 years old or older. This IB applies to all such projects (regardless of Fiscal Year award) funded by the Homeland Security Grant Program (HSGP), the Infrastructure Protection Program (IPP), and the Emergency Management Performance Grants Program (EMPG). These projects have the potential to affect environmental resources and historic properties through ground disturbance, impact to wetlands, floodplains, coastal zones, and other water resources, alteration of historically-significant properties, and impact to threatened and endangered species and migratory birds. Consequently, FEMA engages in a compliance review process to ensure proposed projects comply with applicable federal EHP laws, regulations, and Executive Orders.

Statement of Work

A Statement of Work (SOW) is required to be developed and submitted to FEMA prior to the initiation of projects referenced in this IB. Essential elements and information to include in the SOW are:

- Basic project information (name of project, name of grant and grantee, grant award number, fiscal year, overall purpose and scope of the project, estimated cost, etc.).
- Precise location of the project (street address, city, and state, or latitude and longitude coordinates).
- Visual documentation (site/structure photographs; plans/drawings that define the size and precise location of proposed work; US Geological Survey topographic, flood and wetlands maps; aerial photographs, etc.).
- Description of the project, including (as applicable):
 - Dimensions/acreage/square footage of structure and/or land affected, with height and structural support information for all communication towers.
 - Extent and depth of ground disturbance for new construction and structure modification, including trenching for utility lines, installation of fencing and light posts, tower footings and pads, etc.
- Special elements of the project, including:
 - Special equipment that will be used, staging areas, access roads, easements, etc.
 - Extent of structural modification.
- Year affected building/structure was built (if applicable).



- Information about features, resources, and potential adverse impacts at or near the site, including:
 - Water bodies (rivers, lakes, streams, wetlands, etc.).
 - Floodplains.
 - Historic and cultural resources (historic districts, buildings, landscapes, bridges, piers, dams, archaeological sites, etc.).
 - Migratory birds.
 - Threatened and endangered species and/or critical habitat.
 - Vegetation, including general types of plants, trees, or lack thereof.
 - Geologic features.
 - Tribal cultural and religious sites.
 - Special areas (forests, wildlife refuges, reserves, etc.).
- Any recent or relevant studies, reports, or surveys that were prepared for other agencies or purposes and provide information on environmental resources and/or historic properties in the project area.

Environmental Planning and Historic Preservation Requirements

Site selection is a key factor that can affect the number and complexity of EHP issues that may need to be addressed for a project. Grantees are responsible for identifying environmental resources and historic properties in the project area, which may require coordination with appropriate local, State and/or Federal resource agencies. This information should be included in the SOW and submitted to FEMA in the initial stage of project formulation.

Based on the review of the SOW, FEMA may determine that projects with the potential to have significant adverse impacts to EHP resources and/or public controversy require additional evaluation and documentation, and FEMA will notify the grantee accordingly. Documents required to fulfill compliance responsibilities under Federal EHP laws must be prepared by qualified professionals with EHP expertise and may require a public comment period. Grantees are responsible for the preparation of such documents as well as for the implementation of any mitigation measures identified during FEMA's EHP review that are necessary to address potential adverse impacts. Costs associated with the preparation of EHP documents are allowable grant expenditures.

Inadequate project descriptions and/or documentation of the presence of environmental resources and historic properties in a project area may cause significant delays in the timeliness of the review and affect the project's implementation. Failure of the grantee to meet all Federal, State and local EHP requirements, comply with project conditions established during FEMA's EHP review, and/or obtain applicable permits and approvals may result in project delays or the denial of funding.

FEMA EHP Review Process

Grantees must submit SOWs electronically through their authorized State SAA (or designee) to their FEMA preparedness officer. Preferred submission formats are those supported by Microsoft Office (doc files), and Adobe Acrobat (pdf files). JPEG is the preferred picture format but other widely supported file types may be used. Project reviews may take several weeks or months to complete, so sufficient time and resources must be incorporated into the project planning process to accommodate EHP requirements. Grantees must receive written approval from FEMA prior to the use of grant funds for project implementation.

Additional information regarding EHP compliance requirements for FEMA-funded grant projects is available on the FEMA website at <http://www.fema.gov/plan/ehp/ehp-applicant-help.shtm>. Questions



may be directed to your designated preparedness officer or to the Centralized Scheduling and Information Desk at 1-800-368-6498 or via email at askcsid@dhs.gov.

11 Soil Survey Analysis

11.1 Overview

A soil survey is required at the intended new tower location to determine tower foundation requirements, as well as whether the location is feasible for installing the tower. The soil survey must be performed prior to the tower foundation design and installation to ensure the proper foundation and anchors are specified.

Work to be performed includes:

- Subsurface soil and groundwater conditions, laboratory testing, and engineering analyses

11.2 Preliminary Tower Specifications

- Type: Steel, self-supporting give make and model if known, or make and model to use as a proxy.
- Height: 100 feet AGL, tower foundation to be designed for 150' tower.

11.3 Work Details

These work details are provided as a general outline of work typically and normally conducted as part of a soil survey for the ultimate placement of a radio communications tower of the general specifications listed above. The contractor is expected to bring their own expertise into the preparation of the soil survey and include any and all tasks, items, and reports typically and normally included in a soil survey of this nature, whether they are included in the list below or not.

1. Subsurface exploration, including but not necessarily limited to:
 - A. Field Exploration – One (1) boring, at the approximate tower center. Report of drilling shall include at a minimum:
 1. Total depth of drilling.
 2. How location for drilling was determined. (GPS, topographical map, etc. If GPS, what make and model.)
 3. Log of boring, including:
 - A. Depths at which samples were taken
 - B. Penetration resistance measurements, including what equipment was used (for example, “140-pound automatic hammer falling 30 inches”).
 - C. Minimum of samples every five feet required.



- B. Laboratory Testing – To confirm or modify field descriptions and to be used for the geotechnical engineering analyses and the development of foundation and earthwork recommendations. Properties to be tested for:
 - 1. Moisture content
 - 2. Liquid/plastic limit
 - 3. Grain Size Distribution
 - 4. Water Soluble Sulfate
 - 5. pH/Resistivity
 - 6. Corrosion protection recommendations
- 2. Site conditions, including but not necessarily limited to:
 - A. Site Description
 - B. Subsurface conditions
 - C. Groundwater conditions during and after drilling
- 3. Engineering considerations & recommendations, including but not necessarily limited to:
 - A. General suitability of the site for the proposed construction.
 - B. Foundation recommendations, including
 - 1. Suitability for a large footing or mat foundation
 - 2. Maximum allowable net bearing pressure (in pounds per square foot (psf)
 - 3. Minimum foundation base below adjacent finished grade for frost protection
 - 4. Weight of the foundation and the weight of the soil directly above the foundation to be used for approximating the ultimate uplift resistance.
 - 5. Passive pressure of the soil acting against the sides of the foundation and the friction developed between the base of the foundation and the underlying soils to be used to calculate the lateral loading to be resisted.
- 4. Earthwork considerations and recommendations for:
 - A. Site preparation
 - B. Excavation
 - C. Subgrade preparation
 - D. Drainage (water)
 - E. Site grading
 - F. Backfill
 - G. Equipment needs anticipated

11.4 Assumptions

The following assumptions may be made by the contractor:

- 1. The project consists of the construction of a new steel, self-supporting/lattice communications tower.
- 2. Relatively light axial and lateral loads and moderate overturning moments are anticipated at the base of the tower.



3. The tower will be supported with a large footing/mat type foundation or, if site conditions warrant, a drilled shaft foundation.
4. If felt to be needed by the Interoperability Montana Technical Committee, the contractor will be given the opportunity to review final tower structural loading data when that information becomes available to make any appropriate revisions to the recommendations provided as a result of this analysis.

12 Contractor Project Management Deliverables

- A. Within ten (10) business days of project start:
 - Initial Project Plan and Gantt chart, to be submitted to the Project Manager in either Microsoft Project 2003 (.mpp) or Portable Document Format (.pdf).
- B. Within twenty (20) business days of the soil survey:
 - Soil Survey result by email or paper copy to the Project Manager.
- C. At least fifteen (15) business days before construction is scheduled to begin:
 - A PE stamped tower drawing to the Montana Public Safety Services Bureau (PSSB). PSSB will submit this to the Montana Building Codes Bureau with the building permit application.
 - A Final Tower Erection Drawing to be used by the erection crew submitted to the Project Manager.
- D. At the appropriate times per the Project Plan:
 - Initial, pre-construction site plot showing locations of existing structures and outside equipment and the planned locations of all new structures and outside equipment submitted to the Project Manager. To be kept current by contractor if the planned locations change.
- E. Weekly
 - Updated Status Report submitted to the Project Manager in either Microsoft Word (.doc) or Portable Document Format (.pdf).
 - Updated Project Plan submitted to the Project Manager in either Microsoft Project 2003 (.doc) or Portable Document Format (.pdf).